

U.S.C. § 112, fourth paragraph, and (v) rejected Claims 35 U.S.C. § 103 as being unpatentable over Shimaoka et al. In response to the March 30, 1992 Office Action, Applicant canceled Claims 1-22 and added new Claims 23-68 by a paper filed September 30, 1992. Claims 23-68 were pending in the application at the time of the subsequent examination as indicated in the paper of December 29, 1992. Claims 23-68 were rejected under 35 U.S.C. § 112, second paragraph and under 35 U.S.C. § 103 as being unpatentable over Shimaoka et al. Claims 23-68 are canceled, and Claims 69-99 are added, by this paper.

Applicant respectfully submits, for the reasons given below, that the amendments to the claims place the application in a condition for allowance. Therefore, entry of the amendments is appropriate under Rule 116. If the Examiner disagrees on the allowability of the amended claims, Applicant requests entry of the amendments because the amendments materially reduce and simplify the issues and thereby place the application in a better form for appeal. In particular, the amendments overcome the Examiner's rejections under 35 U.S.C. § 112, second paragraph. Furthermore, the amendments do not introduce new matter or raise new issues which would require further searching as, in performing a first search during the examination of an application, the Examiner is required to conduct a search which covers the invention "as described and claimed" (MPEP § 904). The amendments to the claims do not reach beyond the invention "as described and claimed" as originally filed. The amendments are necessary and could not have been earlier presented because the amendments overcome rejections that were raised for the first time in the final Office Action of December 29, 1992.

The Amendments are Supported by the Specification

Claims 69 and 82 are supported at least by Figure 7 and by the Specification at page 40, line 30 to page 44, line 19.

Claims 70 and 83 are supported at least by Figure 7 and Figure 6A and the Specification at page 38, lines 8-19.

Claims 71, 84 and 85 are supported by Figure 7 and by the Specification at page 44, line 30 to page 45, line 9.

Claims 72-74 and 86-88 are supported at least by Figure 6A and by the Specification at page 32, lines 1-14 and at page 40, lines 23-25.

Claims 75 and 89 are supported at least by Figure 6A and by the Specification at page 32, lines 15-33 and at page 40, lines 25-29.

Claims 75-81 and 90-99 are supported, for example, by Figures 8 and 9 and by the Specification at page 56, line 9 to page 58, line 6.

The Claims Comport with 35 USC § 112, Second Paragraph

The Examiner rejected Claims 23-68 under 35 U.S.C. § 112, second paragraph, as being "indefinite for failing to particularly point out and distinctively claim the subject matter which applicant renders as the invention." Since Applicant requests cancellation of Claims 23-68, the rejection of Claims 23-68 under Section 112, second paragraph, is rendered moot.

The Claims Recite Patentable Subject Matter

The Examiner rejected Claims 67 and 68 under 35 U.S.C. § 101 since "Claims 67 and 68 claim a relational database [which is] printed matter and falls within the printed matter exception to 35 U.S.C. § 101." Claims 69-99 recite structure and methods for a novel computer process. Courts hold such claims are statutory subject matter within the meaning of 35

U.S.C. § 101. Moreover, a computer process or structure is not "printed matter" as that phrase has been defined by the courts.

The Claims are Allowable Over the Art Cited by the Examiner

The Examiner rejected Claims 23-68 "under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103 as obvious over Shimaoka et al." Claims 23-68 are superseded by Claims 69-99.

Claim 69 recites memory means containing "entity definition table means" and "means . . . for retrieving from said entity definition table means [an] entity type record." Claim 69 further recites that "said entity instance table means is specified by said entity type record." Applicant's Claim 82 similarly recites a "method for retrieving a selected entity from a relational database" comprising "retrieving from entity definition table means of said relational database an entity type record". Claim 82 further recites that the "entity instance table means [is] specified by said retrieved entity type record." Shimaoka et al. do not teach an entity definition table or means for retrieving from such a table an entity definition record. Shimaoka et al. therefore do not teach the invention recited by Applicant's Claims 69 and 82.

Furthermore, Shimaoka et al. do not evidence an appreciation for the problem solved by Applicant's invention and therefore do not suggest Applicant's invention.

Applicant's Figure 7 shows that entity instances can be stored in multiple entity instance tables. Furthermore, the Specification teaches at page 46, lines 14-17 that "machine 815 searches through the ENT.DEF table 500 to locate the entity type number 'ETN' of the named class and the Entity-instances Table 'EiT' where all instances of this 'Address' entity class are stored." The importance of entity definition tables is taught by the Specification at page 49, lines 9-15:

Since the REL.DEF and ENT.DEF tables may be expanded as desired by adding new entries to empty middle or bottom slots found within them, a lay user can create new entities, new relation classes and restructure the schema of explicitly-defined relationships and entities forever without having to reprogram the database system 800 at the source or object code level.

Shimaoka et al. teach a single item information file 10 (Figure 2 of Shimaoka et al.) which contains item records of all types. Shimaoka et al. expressly teach at column 4, lines 12-24 that the item records of Figures 4A-4D of Shimaoka et al. are item records of various types and stored in single item information file 10. Altering the structure of the contents of the item records of Shimaoka et al.'s Figures 4A-4D would require comprehensive reorganization of item information file 10 which would in turn require reprogramming of item information record registering section 31 (Shimaoka et al.'s Figure 2), relation information record registering section 33 and record search section 33 at the source or object code level. This is easily illustrated by considering a simple example.

Consider the data entry names of Shimaoka et al.'s Figures 4A-4D, which are shown to be of a fixed length and which are shown to contain "abc", "efg", "lmn" and "xyz". Suppose for illustrative purposes that the fixed length of the data entry name field is eight (8) characters. Figures 4A-4D of Shimaoka et al. show item information records with item codes of "JK" and "WS". Suppose that a user of Shimaoka et al.'s data management system desires to add an item code "AB" which requires a data entry name longer than existing data entry names in item information file 10, e.g., data entry names which are 20 characters in length. To accommodate such an extension of the data management system of Shimaoka et al., either (i) data dictionary/directory access section 30 and item

information file 10` (Shimaoka et al.'s Figure 2) must be reorganized to accommodate 20 character data entry names or (ii) data dictionary/directory access section 30 and item information file 10 must be reconfigured to permit variable length data entry names. In either case, data dictionary/directory access section 30 must be reconfigured at the source code or object code level.

Shimaoka et al. therefore do not evidence an appreciation for the problem solved by Applicant's invention, namely, enabling the extension of the relational database without requiring reconfiguration of the search and access protocol. As noted by the cited portions of Applicant's Specification, this is an inherent feature of the structure recited in Claim 69 and the method recited in Claim 82. Therefore, not only does Shimaoka et al. fail to suggest or disclose the entity instance table, Shimaoka et al. failed to appreciate the inherent advantage of the use of such a table. Thus, Shimaoka et al. do not teach or suggest Applicant's Claims 69 and 81.

Claim 70 further recites "said retrieved relation type record further comprises a table identifier, wherein said table identifier identifies a relation table in said relation instance table means." Similarly, Claim 83 recites "retrieving from said relation type record a table identifier wherein said table identifier identifies a relation table in said relation instance table means." Applicant's Figure 6A and the Specification at page 38, line 35 to page 39, line 3 teach that relation instances can be stored in multiple relation instance tables. The inclusion of a table identifier in a relation type record allows relations of different types to be stored in separate relation instance tables. As discussed above with respect to Claims 69 and 82, the relation definition table provides extensibility without requiring reconfiguration of access and search protocols, i.e., "without having to reprogram

the database system 800 at the source or object code level" (Specification at page 49, lines 14-15). For example, a new type of relation can be created and relation instances of this new type can be stored in a new relation instance table by storing in the relation definition table a relation type record identifying a new relation instance table.

Shimaoka et al. do not teach inclusion of a table identifier in a relation type record. In fact, the inclusion of a table identifier in a relation type record is useless in the data management system taught by Shimaoka et al. Figure 2 of Shimaoka et al. shows a single relation information file 12. Shimaoka et al. do not teach multiple relation instance files and therefore do not evidence an appreciation for the need to include specification of one of multiple relation instance files in a relation type record. Shimaoka et al. therefore do not teach or suggest a relation type record which identifies a relation instance table. Applicant's Claims 70 and 83 are therefore patentably distinguishable from Shimaoka et al. independently of dependency on Claims 69 and 82, respectively.

Applicant's Claim 71 is dependent on Claim 69 and is therefore similarly patentably distinguishable from Shimaoka et al. Applicant's Claims 84-85 are dependent on Claim 82 and are therefore patentable over Shimaoka et al. for the reasons given above with respect to Claim 82.

Applicant's Claims 72-74 supersede canceled Claims 29 and 30. Claims 73 and 74 are dependent on Claim 72 which recites "memory means containing (i) relation definition table means comprised of at least one relation type record [which] includes cardinality data" and

means . . . for detecting a cardinality violation for a first relation type, said means for detecting comprising means for determining whether said relation instance table means contains . . . a first relation . . . between a first entity and a second entity; and means for determining whether

said relation instance table means contains . . . a second relation . . . between said first entity and a third entity.

Applicant's Claims 86-88 supersede canceled Claim 51. Claims 87 and 88 are dependent on Claim 86 which recites "storing . . . a plurality of relation type records . . . [which include] cardinality data" and

detecting a cardinality violation for a first relation type wherein said step of detecting comprises determining whether said relation instance table means contains . . . a first relation . . . between a first entity and a second entity; and determining whether said relation instance table means contains . . . a second relation . . . between said first entity and a third entity.

The Specification teaches at page 32, lines 8-14 that a relation type can be one-to-one, i.e. exclusive, or one-to-many, i.e. non-exclusive. In contrast, Shimaoka et al. teach a two-dimensional array 40 (Shimaoka et al.'s Figure 6) whose elements are pairs of alphanumeric characters. Each alphanumeric character pair is associated with a short alphanumeric string which describes the type of relation represented. The Examiner has failed to cite disclosure in Shimaoka et al. of the storage in relation definition records of properties of relation types beyond a short alphanumeric description. This is because Shimaoka et al. fail to teach or suggest the inclusion of cardinality data within relation definition records or a mechanism for implementing the cardinality of each type of relation as defined by various relation definition records. Claims 72 and 86 are therefore patentably distinguishable from Shimaoka et al. As Claims 73-74 and Claims 87-88 are dependent on Claims 72 and 86, respectively, Claims 73-74 and 87-88 are patentable over Shimaoka et al. for at least the reasons given above with respect to Claims 72 and 86.

Applicant's Claims 75 recites "memory means containing (i) relation definition table means comprised of at least one

relation type record [which] includes mandatory coupling data defining mandatory coupling" and

means . . . for detecting a mandatory coupling violation . . . , said means for detecting comprising means for determining whether said entity instance table means contains a first entity instance record of said first entity type; and means for determining whether said relation instance table means contains a relation instance record defining a relation of said first relation type between said first entity instance record and a second entity instance record of said second entity type.

Claim 89 recites "storing a plurality of relation type records . . . [including] mandatory coupling data" and

detecting a mandatory coupling violation for . . . , said step of detecting comprising determining whether said entity instance table means contains a first entity instance record of said first entity instance type; and determining whether said relation instance table means contains no relation instance record defining a relation between said first entity instance record and a second entity instance record of said second entity type.

As discussed above, Shimaoka et al. do not teach or suggest storage, within relation type records, of relational properties other than a short alphanumeric description of the relation type. In particular, Shimaoka et al. do not teach or suggest the storage, within relation type records, of mandatory coupling data or a mechanism to implement mandatory coupling. Applicant's Claims 76 and 89 are therefore patentably distinguishable from Shimaoka et al.

Applicant's Claims 76-81 and 90-99 supersede canceled Claims 41-43 and 59-66. In rejecting Claims 41-43 and 59-66, the Examiner states "Shimaoka et al. shows three different types of search processing. 1) processing for obtaining object information from source information and a relation 2) processing for obtaining source information from object information and a relation and 3) processing for obtaining source and object information from a relation."

Applicant's Claims 76 and 90 recite

a first search path record [which] identifies a first entity and a first relation; . . . retrieving . . . a second entity wherein said second entity is related to said first entity by said first relation; . . . a second search path record [which] identifies a second relation; and . . . retrieving . . . said selected entity wherein said selected entity is related to said second entity by said second relation.

Applicant's Claims 79 and 93 recite

a first search path record wherein said first search path record identifies a first entity and a first relation; . . . retrieving . . . a first group of entities comprising all entities . . . related to said first entity by said first relation; . . . a second search path record [which] identifies a second relation; and . . . retrieving . . . [a] selected group of one or more entities [which] comprises all entities . . . related to at least one of said first group of entities by said second relation.

Applicant's Claims 96 and 98 recite

a first search path record [which] identifies a first relation; . . . retrieving . . . a first entity wherein said first entity is related to a second entity by said first relation; . . . a second search path record [which] identifies a second relation; and . . . retrieving . . . said selected entity wherein said selected entity is related to said first entity by said second relation.

Applicant's Claims 97 and 99 recite

a first search path record wherein said first search path record identifies a first relation; . . . retrieving . . . a first group of entities comprising all entities . . . related to at least one of [a plurality of] entities by said first relation; . . . a second search path record [which] identifies a second relation; and . . . retrieving . . . [a] selected group of one or more entities [which] comprises all entities . . . related to at least one of said first group of entities by said second relation.

The Specification teaches at length that the results of one database inquiry are used to formulate subsequent database

inquiries. In particular, the Specification teaches at page 44, lines 20-25 as follows:

The uncovered instances can then serve as stepping stones for answering further parts of a compound query. Consider for example the two-level query, "What are all the business addresses of my customer Expert Electronics, and once you know that, what other customers use those addresses as their business addresses?"

Thus, independent Claims 76, 79, 90, 93 and 96-99 recite a two-step search process where, in the second search step, the scope of the search can be expanded. Figures 8, 9A and 9B of Shimaoka et al. teach only very simple single step search processes. Nothing in Shimaoka et al. teaches or suggests a multiple-step compound inquiry process. Therefore Claims 76, 79, 90, 93 and 96-99 are patentably distinguishable from Shimaoka et al.

Claims 77 and 78 are dependent on Claim 76, Claims 80 and 81 are dependent on Claim 79, Claims 91 and 92 are dependent on Claim 90, and Claims 94 and 95 are dependent on Claim 93. Therefore Claims 77, 78, 80, 81, 91, 92, 94 and 95 are similarly patentable over Shimaoka et al. for the reasons given above with respect to Claims 76, 79, 90 and 93.

Thus, all claims at issue, i.e. Claims 69-99, are patentable over Shimaoka et al. are therefore in condition for allowance. Accordingly, allowance of Applicant's Claims 69-99 is respectfully requested. If the Examiner's next action is

other than allowance of Claims 69-99, the Examiner is respectfully requested to telephone Applicant's attorney at (408) 283-1222.

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